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Prevalence of *Toxoplasma gondii* Antibodies in Sera of Turkeys, Chickens, and Ducks from Egypt

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ABSTRACT: Sera from 173 turkeys, 108 chickens, and 48 ducks from Giza, Egypt, were tested for the presence of anti-*Toxoplasma gondii* antibodies by means of the modified agglutination test using mercaptoethanol and formalin-fixed tachyzoites. The prevalence of anti-*T. gondii* antibodies (>1:25) among turkeys, chickens, and ducks was 59.5%, 47.2%, and 50%, respectively.

Birds and rodents are important intermediate hosts of *Toxoplasma gondii* because they serve as a source of *T. gondii* infection for cats (Dubey and Beattie, 1988). Cats excrete the environmentally resistant *T. gondii* oocysts in their feces after ingesting tissue cysts from infected animals. Viable *T. gondii* was found in 54% of 50 feral chickens caught around human dwellings in Costa Rica (Ruiz and Frenkel, 1980). In that study, *T. gondii* infection was detected by bioassay of chicken tissues in mice, because the Sabin–Feldman dye test does not detect antibodies in chicken sera (Frenkel, 1981). Recently, Dubey,

Camargo, Ruff, Wilkins et al. (1993) and Dubey, Camargo, Ruff, Shen et al. (1993) demonstrated that the modified agglutination test (MAT) was highly sensitive and specific for detecting antibodies to *T. gondii* infections in chickens and turkeys.

Little is known of toxoplasmosis in turkeys and ducks. There are reports of fatal toxoplasmosis in 2 turkeys from the U.S. (Howerth and Rodenroth, 1985; Quist et al., 1995). Lindsay et al. (1994) found MAT antibodies to *T. gondii* in 12 of 17 sera from turkeys in the U.S. and they also isolated *T. gondii* from the hearts of 8 of 16 turkeys. Boehringer et al. (1962) reported fatal toxoplasmosis in a duck from Argentina. Literák and Hejlíček (1993) found antibodies to *T. gondii* in 5 (1.7%) of 297 ducks and isolated *T. gondii* from 1 of 60 ducks from the Czech Republic.

Because the prevalence of *T. gondii* in chickens, turkeys, and

TABLE I. Seroprevalence of *Toxoplasma gondii* in turkeys, chickens, and ducks in Egypt.

Animal species	No. of sera	No. with anti- <i>T. gondii</i> antibodies			Total seropositive (≥1:25)	Percent seropositive (≥1:25)
		1:25	1:50	1:500		
Turkeys	173	28	26	49	103	59.5
Chickens	108	25	4	22	51	47.2
Ducks	48	14	5	5	24	50.0

ducks is a good indicator of the contamination of the soil with *T. gondii* oocysts and because there is no information on the prevalence of *T. gondii* in turkeys and ducks, and only limited information on toxoplasmosis in chickens in Egypt, we conducted the present serologic survey for *T. gondii* infections in chickens, ducks, and turkeys.

Blood samples were collected from 173 turkeys (large white turkey poults, 5–6 mo old) and 48 ducks (native breed, 4–7 mo old) from private farms in the suburbs of Giza, Egypt. Blood samples were also collected from 108 broiler chickens (native breed, 6–8 mo old) obtained from markets in Giza, Egypt. Sera were separated and stored at -20°C until tested for antibodies to *T. gondii*. Sera were diluted 1:25, 1:50, 1:500, and tested for antibodies to *T. gondii* by the MAT using formalized whole tachyzoites and mercaptoethanol (Dubey and Desmonts, 1987). A positive reaction at a 1:25 dilution was considered indicative of previous exposure to *T. gondii*.

The seroprevalence of *T. gondii* was 59.5%, 47.2%, and 50.0% in turkeys, chickens, and ducks, respectively (Table I). The 50% seroprevalence of *T. gondii* in ducks in the present study is markedly higher than the 1.7% prevalence reported by Literák and Hejlíček (1993).

In the present study, 49 of 173 turkeys had a titer of $\geq 1:500$, suggesting recently acquired infection, probably by ingesting oocysts. Experimentally, turkeys fed *T. gondii* oocysts developed MAT titers by 14 days postfeeding (Dubey, Camargo, Ruff, Wilkins et al., 1993). Among all serologic tests, MAT was found to be the most sensitive for detecting antibodies in turkey sera (Dubey, Camargo, Ruff, Wilkins et al., 1993). Lindsay et al. (1994), using the same MAT test used in this investigation, reported MAT antibodies in 12 of 17 sera from turkeys in the U.S.. They isolated *T. gondii* from 8 of 16 turkeys by bioassay in mice; 6 of these 8 turkeys had a titer of 1:50, 1 had a titer of $\geq 1:500$, and 1 had a titer of $\geq 1:25$.

The 47.2% prevalence of *T. gondii* antibodies in chickens slaughtered for food in Egypt is similar to the 39.5% prevalence in chickens reported from India (Devada et al., 1998). *Toxoplasma gondii* antibodies were reported to be present in 22–53.3% of chickens in Egypt by the Sabin–Feldman dye test, indirect hemagglutination assay (IHA), or the complement fixation test (Rifaat et al., 1969; Hassanian et al., 1997). However,

both IHA and the dye test were found to be insensitive for detecting *T. gondii* antibodies in experimentally infected chickens (Dubey, Camargo, Ruff, Shen et al., 1993). Moreover, as indicated earlier the dye test does not work with chicken sera (Frenkel, 1981).

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